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SPECIFICATIONS

INSPECTION AND TESTING
SERVICES
(B-595-A-A910)

HANFORD WASTE VITRIFICATION PLANT

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE



FLUOR DANIEL
ADVANCED TECHNOLOGY DIVISION
CONTRACT 8457

DOE CONTRACT NO.
DE-AC06-86RL10838

U.S. DEPARTMENT OF ENERGY
Hanford Waste Vitrification Plant
Richland, Washington
DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC.
Advanced Technology Division
Fluor Contract 8457

INSPECTION AND TESTING SERVICES
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"APPROVED FOR CONSTRUCTION"

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U.S. DEPARTMENT OF ENERGY
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**INSPECTION AND TESTING SERVICES
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DIVISION 1 - GENERAL REQUIREMENTS

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SECTION 01650
INSPECTION AND TESTING SERVICES

PART 1 GENERAL

1.1 SUMMARY

This Section covers the technical requirements for jobsite inspection and testing services required to verify that the earthwork, concrete, concrete materials and asphalt concrete materials for the Hanford Waste Vitrification Plant (HWVP) project conforms to the drawings and specifications applicable thereto. The inspection and testing services specified are applicable to Safety Class 1, 2, 3 and 4 structures, components, and items.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Except as modified by the requirements specified herein or on the Contract Drawings, work included in this specification shall conform to the applicable provisions of these publications.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 311.5R 1988 Batch Plant Inspection and Field
Testing of Ready-Mixed Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C31 1990 (Rev. A) Standard Practice for Making
and Curing Concrete Test Specimens in the
Field

ASTM C39 1986 Standard Test Method for Compressive
Strength of Cylindrical Concrete Specimens

ASTM C42 1990 Standard Practice for Obtaining and
Testing Drilled Cores and Sawed Beams of
Concrete

ASTM C109 1990 Standard Test Method for Compressive
Strength of Hydraulic Cement Mortars
(Using 2 Inch or 50 mm Cube Specimens)

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ASTM C136	1984 (Rev. A) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	1990 (Rev. A) Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM C172	1990 Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173	1978 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231	1991 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C567	1991 Standard Test Method for Unit Weight of Structural Lightweight Concrete
ASTM C1064	1986 Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
ASTM D422	1963-E1 (R 1990) Standard Test Method for Particle-Size Analysis of Soils
ASTM D1140	1954-E1 (R 1990) Standard Test Method for Amount of Material in Soils Finer Than the No. 200 (75-Micrometer) Sieve
ASTM D1556	1990 Standard Test Method for Density of Soil in Place by the Sand-Cone Method
ASTM D1557	1978-E1 (R 1990) Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-inch (457-mm) Drop
ASTM D2167	1984 Standard Test Method for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method
ASTM D2172	1988 Standard Test Methods for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures
ASTM D2922	1981 (R 1990) Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

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ASTM D4718 1987 Standard Practice for Correction of
Unit Weight and Water Content for Soils
Containing Oversize Particles

ASTM E329 1990 Standard Practice for Evaluation of
Testing and Inspection Agencies as Used in
Construction

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

M41-10 1988 Standard Specification for Roads,
Bridge and Municipal Construction

1.3 **RELATED REQUIREMENTS**

(Not Used)

1.4 **DEFINITIONS**

(Not Used)

1.5 **SYSTEM DESCRIPTION**

The system covered by this section is a testing laboratory and personnel capable of performing the inspection and testing described in Part 3.

1.6 **SUBMITTALS**

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Proof of accreditation per Paragraph 2.1.2.

1.6.2 Reports of all earthwork inspection tests specified in Paragraph 3.2.1.

1.6.3 Reports of all concrete tests specified in Paragraph 3.2.2.

1.6.4 Batch plant inspection report specified in Paragraph 3.2.3.

1.6.5 Inspection and test reports on asphalt concrete specified in Paragraph 3.2.4.

1.7 **CLASSIFICATION OF SYSTEM AND COMPONENTS**

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

(Not Used)

PART 2 PRODUCTS

2.1 MATERIALS/EQUIPMENT

2.1.1 The Seller is responsible for providing all necessary materials and equipment to perform the testing described in Part 3.

2.1.2 The laboratory, including equipment, personnel and procedures, shall meet the requirements of ASTM E329 and shall be accredited by an independently recognized authority within the last two years to perform the work described in this section.

2.2 FABRICATION AND MANUFACTURE

(Not Used)

PART 3 EXECUTION

3.1 PREPARATION

(Not Used)

3.2 INSTALLATION, APPLICATION AND ERECTION

3.2.1 Earthwork

3.2.1.1 Imported fill materials utilized for backfill, shall be properly characterized and verified by the Seller utilizing grain-size distribution (ASTM D422 and D1140).

3.2.1.2 A minimum of one Moisture-Density Relation test (ASTM D1557) shall be performed for each type of fill material used. Corrections to adjust the laboratory maximum dry density and optimum moisture content for soil with oversize particles shall be made in accordance with ASTM D4718.

3.2.1.3 A minimum of one field density test shall be made for each 3000 square feet, and fraction thereof of area backfill, and each 200 linear feet, and fraction thereof of trench backfill. Tests shall be made for each lift of fill material placed. Lift thickness is defined in each construction package. Field density tests shall be performed in accordance with ASTM D1556, D2167 or D2922 as appropriate. Nuclear density tests may be performed (in accordance with ASTM D2922) provided a minimum of 20 percent of

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tests are performed in accordance with ASTM D1556 or D2167. A minimum of one laboratory compaction test (ASTM D1557) and one grain-size analysis test (ASTM D422 and D1140) shall be made for every 100 field density tests after initial fill characterization is complete. Other classification tests may also be performed if necessary and approved by the Buyer.

- 3.2.1.4 Seller shall record the approximate location (elevation and coordinates) of each field density test performed.
- 3.2.1.5 Seller shall report the results of any failed tests or inspection to the Buyer immediately. Subsequent testing on all reworked areas shall be performed to determine conformance with the specification requirements.
- 3.2.2 Concrete Testing
- 3.2.2.1 Testing shall include compressive tests of molded concrete cylinders, compressive tests of hardened concrete, tests for slump, air content, fresh concrete temperature and unit weight of concrete delivered to the jobsite. All samples of fresh concrete shall be taken at the discharge of the pump-line or point of placement. Samples may also be taken at the discharge end of mixer truck, in lieu of point of placement, when directed by Buyer.
- 3.2.2.2 Secure composite samples in accordance with ASTM C172. Mold and cure at least three specimens per set (and more if requested by the Buyer) from each sample in accordance with ASTM C31. Test specimens in accordance with ASTM C39. Two specimens shall be tested at 28 days for acceptance and one shall be tested at 7 days for information. Additional specimens, when requested by the Buyer, shall be tested at the time specified by the Buyer. The average strength of the two 28-day specimens from the same sample, shall be the strength test result for that sample. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, using ASTM C143. Determine air content of concrete sample for each strength test in accordance with ASTM C173 or C231. Determine temperature of concrete sample for each strength test in accordance with ASTM C1064. Determine unit weight of lightweight concrete in accordance with ASTM C567. Determine dry unit weight of normal concrete in accordance with 3.2.2.6.

For concrete mix Class MC3P and MC4P, mold and cure at least four specimens per set. Two specimens shall be tested at 90 days for acceptance, and one shall be tested at 7 days and one at 28 days for information. The average strength of the two 90-day specimens from the same sample, shall be the strength test result for that sample.

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3.2.2.3 Tests for slump, air content and concrete temperature shall be made for first batch of concrete produced each day and every 50 cubic yards placed. When test data establishes confidence that conformance with requirements of specifications is being met, the test frequency may be adjusted with approval from Buyer.

3.2.2.4 Unless specified otherwise on the Contract Drawings or specifications, the rate of sampling shall be at least one set (as defined in 3.2.2.2) per day for each class of concrete placed and as follows:

- A. Structures and Foundations: At least one set per 150 cubic yards of concrete nor less than once for each 5000 square feet of surface area of slabs or walls. At least one set shall be obtained for each structure or foundation, except when placing a number of items each smaller than 50 cubic yards, one set per 50 cubic yards shall suffice.
- B. Paving and Slabs at Grade: One set per 50 cubic yards of concrete.
- C. Underground Duct Banks: One set taken at the beginning of each day's concreting work.
- D. Take additional samples when observations on tests indicate nonconformance with specifications.
- E. Make and test core samples on hardened concrete when requested by Buyer in accordance with ASTM C42.

3.2.2.5 The following data shall be recorded at the time the cylinders are prepared and shall be included in the test report:

- A. Test cylinder number and letter
- B. Truck number and ticket number
- C. Time batched
- D. Unique location identification as provided by the structure number and concrete placement number
- E. Class of concrete
- F. Slump, air content and fresh concrete temperature
- G. Date and time placed

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H. Ambient temperature at time of pour

I. Name of inspector making cylinders

3.2.2.6 The procedure for determining the dry density of concrete shall be based on a standard 7 day laboratory cured cylinder oven dried for 24 hours at a temperature of 212°F to 230°F and allowed to cool in dry air to a temperature of 68°F to 77°F.

3.2.2.7 Cement grout shall be sampled and tested in accordance with ASTM C109 as applicable at least once each day used or as directed by the Buyer.

3.2.3 Batch Plant Inspection and Testing

3.2.3.1 When requested by the Buyer, the Seller shall perform an inspection of the concrete batch plant in accordance with ACI 311.5R, Sections 1.3.1 through 1.3.6.

3.2.3.2 The inspector shall issue a report showing all test results and documenting observations made during the inspection period.

3.2.4 Asphalt Concrete

3.2.4.1 Take samples and perform the tests herein below indicated to ascertain the compliance of the work with the specified requirements.

A. Job Mix Compliance

For each 50 tons, and fraction thereof, of mixture incorporated into the work each day, sample and test the mixture for bituminous content per ASTM D2172 and aggregate gradation per ASTM C136.

B. Field density tests shall be performed in accordance with M41-10, Section 5-04.3(10)B.

3.3 FIELD QUALITY CONTROL

(Not Used)

3.4 ADJUSTMENTS

(Not Used)

3.5 CLEANING

(Not Used)

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3.6 PROTECTION

(Not Used)

3.7 DEMONSTRATION

(Not Used)

3.8 SCHEDULES

(Not Used)

END OF SECTION